SEWER RENOVATION CONTRACT
Decision Paper

1. INTRODUCTION. Contract documents for the renovation of the trunk sewer system were prepared by P.H. Weis & Assoc. and the contract was bid in December, 1985. The low bid was 57% higher than the engineer's estimate. A problem now exists in that the total bond funding is only $7.5 million and the work expected to be constructed from these funds, of which this project is a part, may cost $10 million. Two major decisions need to be made in order to resolve this problem. They are:

What is to be constructed?
What type of contract is to be negociated?

2. FACTS.

a. Engineer's estimate:		$3,400,000
b. Other bids:	Helmkamp	$5,330,000
	McCarthy	$5,627,020
	Keeley Bros	$5,665,000
	J.S. Alberici	$5,998,500
	Tarlton	$7,152,000

3. ALTERNATIVE CONSTRUCTION APPROACHES.

a. Award as designed and bid. Est. $5,330,000

1. Advantages:

Already designed and bid. Known cost unless unforseen circumstances are discovered in construction. Good cross connection system.

2. Disadvantages:

U.E. right-of-way conflicts with box A. Relies on one central box, H. Adds two new boxes to system. Extends two boxes, (potential differential settlement problem). Must drive pile under high voltage wires. Requires R.R. track outage. Requires relocation of benzene line.

b. Eliminate part of Phase IIIA, (double 36"). Est. $4,892,258

1. Advantages:

Can modify current contract with unit price deductions. Known cost unless unforseen circumstances are discovered in construction. Good cross connection system. Does not require R.R. track outage.

2. Disadvantages:

U.E. right-of-way conflicts with box A. Relies on one central box, H. Adds two new boxes to system. Extends one box. Must drive pile under high voltage wires.

c. Eliminate all of Phase IIIA. Est. $4,558,780

1. Advantages:

Can modify current contract with unit price deductions. Known cost unless unforseen circumstances are discovered in construction. Good cross connection system. Does not require R.R. track outage.

2. Disadvantages:

U.E. right-of-way conflicts with box A. Relies on one central box, H. Adds two new boxes to system. Extends one box. Must drive pile under high voltage wires.

d. Eliminate Phase I and II pipe. Est. $4,353,000

WGK 1484145

1. Advantages:

Can modify current contract with unit price deductions. Known cost

unless unforseen circumstances are discovered in construction. Defers second pipe toward Rt. 3 until later phase when actually beneficial. Reduces number of boxes by one. No pile driving under wires.

2. Disadvantages:

Requires movement of benzene lines. Provides no H-D bypass. Relies on one central box. Requires extensive bypass pumping. Limits pipes under tracks to two. Requires R.R. track outage.

e. Redesign Alternate #3. Est. $3,861,154

1. Advantages:

Adds fourth pipe under tracks. Requires no pile driving under high voltage wires.

2. Disadvantages: Adds one box to system. Relies on use of old, double 36" pipe or adds $322,000 to cost to replace them. Realize no benefit from 42" pipe going to Rt. 3 from manhole D until connection in later phase; could deferr construction until then delaying $170,000 expense. Relies on one central box, E. Costs may increase if unforseen circumstances are discovered. Must be redesigned and rebid or contracted on time and materials basis. Requires extensive R.R. track outage. Extends one box.

f. Redesign Alternate #4. Est. $4,487,854

1. Advantages:

Provides wide dispersion of flow routes. Provides double cross connection H-G & D-E. Does not rely on one central box. No boxes are extended.

2. Disadvantages:

Adds two boxes to system. Costs may increase if unforseen circumstances are discovered. Must be redesigned and rebid or contracted on time and materials basis. Requires extensive R.R. track outage. Requires pile driving under high voltage lines.

g. Redesign Alternate #5. Est. $3,982,730

1. Advantages:

Reduces number of boxes in system by one. Extends no boxes. Requires no sheet pile under high voltage lines.

2. Disadvantages:

Relies on one central box. Costs may increase if unforseen circumstances are discovered. Cannot tunnel H-D. Must be redesigned and rebid or contracted on time and materials basis. Requires extensive R.R. track outage.

h. Point Repairs, TV & Grout. Est. $2,130,931

1. Advantages:

Owner retains total flexability. Can do TV & grout first, then have all point repairs identified. Can schedule repairs to match funds. Do no unnessary work. No bypass pumping. No sheet pile under high voltage lines. Can defer new line toward Rt. 3 until needed. Can quit when funds expended. Cannot overrun budget despite problems encountered. Can add new lines as desired if funds are remaining. Adds no boxes. Functionality of system is proven.

2. Disadvantages:

Uncertain cost. Must do on time and materials basis. Requires close owner supervision. Owner takes all risk. Repair under T.R.R.A. tracks will be difficult. Does not improve system. Relies on one central box.

4. CONTRACT ALTERNATIVES. WGK 1484146

a. Award as Bid.

1. Advantages:

Fixed cost. Low risk. At this time, will be a minimum of work to execute. Requires minimal management.

2. Disadvantages:

High cost, exceeding money available. Little flexability. Requires much supervision to assure quality. No incentive for contractor to save owner money.

b. Rebid Lump Sum.

1. Advantages:

Fixed cost. Low risk. Requires minimal management. Can adjust scope of work by redesigning.

2. Disadvantages:

Low probability of savings from rebid. Delays award date. Little flexability. Requires close supervision to assure quality. No incentive for contractor to save owner money.

c. Negociate Adjusted Lump Sum.

1. Advantages:

Fixed cost. Low risk. Requires minimal management. Can adjust scope of work by redesigning. Small delay for award date.

2. Disadvantages:

Must reduce scope to reduce price. No incentive for contractor to save owner money. Low flexability. Requires close supervision to assure quality. High probability of getting less construction for dollars paid.

d. Time and Materials.

1.Advantages:

Flexability. Control costs. Pay only for work done. Adjust work to meet changing requirements. No incentive to do poor quality work. No delay in award date.

2. Disadvantages:

Requires close supervision or costs soar. No incentive for contractor to save owner money. Requires knowledgable staff to manage. Must manage own project. Owner assumes all risk.

e. T&M with Ceiling.

1. Advantages:

Flexability. Control costs. Pay only for work done. Adjust work to meet changing requirements. No incentive to do poor quality work. No delay in award date. Limits risk.

2. Disadvantages:

Requires close supervision or costs soar to the guaranteed maximum. No incentive for contractor to save owner money. Requires knowledgable staff to manage. Must manage own project. Owner assumes some risk.

f. T&M with Savings Sharing.

1. Advantages:

Flexability. Control costs. Pay only for work done. Adjust work to meet changing requirements. No incentive to do poor quality work. No delay in award date. Limits risk.

2. Disadvantages:

Requires knowledgable staff to manage. Must manage own project. Owner assumes some risk.

g. T&M with Award Fee.

WGK 1484147

1. Advantages:

Flexability. Control costs. Pay only for work done. Adjust work to meet changing requirements. No delay in award date. Incentive to do

good work and keep owner pleased.

2. Disadvantages:

Requires knowledgable staff to manage. Must manage own project. Owner assumes all risk.

5. RECOMMENDATION.

The most cost effective alternative is to perform point repairs, televise and grout. Almost all of this work is in the current project including the televising and grouting, manhole relining, excavation, small miscelaneous items and overhead. The added work includes the estimated three point repairs where pipe would be replaced, raking and regrouting the joints in existing line E-B, televising and grouting the 30" line from manhole H to box E, replacing the double 36" line between boxes G and E, and relining box G. If after inspecting line E-B it was found to be unservicable, it could be replaced with a parallel line to line D-B. This alternative, however, simply rehabilitates the existing system and does not improve it.

Should system improvement be imperative, redesign alternate #5 is the best value. The one major drawback of this design is the concentrati of flows through one, central box. This disadvantage can be minimized by constructing the box so that flows can be diverted in all directions.

The form of contract recommended is time and materials with award fee. This form will allow close control of the work and management of the project while providing an incentive for the contractor not only to help in reducing field costs, but also to assist in the management of the job.

P.H. WEIS & ASSOCIATES INC.
ENGINEERS / ARCHITECTS / PLANNERS
PROJECT NO. 7313-84-2

BID TABULATION
VILLAGE OF SAUGET, ILLINOIS
SEWER REHABILITATION
PHASES I, II & IIIA

DECEMBER 19, 1985

	J. S. Alberici Construction Co., Inc.	Keeley Bros. Contracting Company	McCarthy Brothers Company	Tarlton Corporation	Helmkamp Construction Company	
BID BOND	5%	5%	5%	5%	5%	
BASE BID	$5,998,500.00	$5,665,000.00	$5,724,720.00	$7,152,000.00	$5,330,000.00	
ALTERNATE NO. 1 - 2" Furan Conc. Slab in Lieu of Furan Fiberglass Reinforced Panels	+60,000.00	+67,500.00	+51,634.00	+100,000.00	+60,000.00	
	+30 days	0 days	0 days	+200 days	0 days	
ALTERNATE NO. 2 - Open Excavate in Lieu of Tunnelling	+65,000.00	+225,000.00	+276,345.00	+1,000,000.00	-50,000.00	
	+30 days	+21 days	+30 days	+200 days	+30 days	
ALTERNATE NO. 3 - Furan Conc. Bullrings in Lieu of Arched Brick Bullrings	No Change	+57,000.00	-6,800.00	+70,000.00	No Bid	
	0 days	0 days	0 days	+30 days		
ALTERNATE NO. 4 - Oversize Tunnel to Construct Full Furan Tamping Mix Jt. in Tunnel	+525,000.00	+650,000.00	-90,900.00	+500,000.00	No Bid	
	+60 days	+86 days	-15 days	+100 days		
ADDENDA NOTED	1 Thru 4	1 Thru 4	1 Thru 4	1 Thru 4	1 Thru 4	

47,7~

5,627,020

WGK 1484149

ELIMINATE PART OF PHASE IIIA
(HELMKAMP PRICES)

Removal of Box G	$ 15,000
Extension of Box D	
Concrete (27.86 cu.yds. @ $200.00/cu.yd.)	5,572
Forms (840 sq.ft. @ $12.50/sq.ft.)	10,500
Reinf. (5,300 lbs. @ $1.00/lb.)	5,300
Acid Brick & Membranes (360 sq. ft. @ $80.00/sq.ft.)	28,800
Exterior Membrane (270 sq.ft. @ $20.00/sq.ft.)	5,400
Volclay Panels (160 sq.ft. @ $5.00/sq.ft.)	800
Fiberglass Panels (120 sq.ft. @ $20.00/sq.ft.)	2,400
Removal of Existing Wall	10,000
Crushed Stone Base	1,000
Earthwork (4,700 cu.yds. @ $15.00/cu.yd.)	70,500
New 36" VCP (172 LF @ $400/LF)	68,800
Sheet Piling (2,500 sq.ft. @$30/sq.ft.)	75,000
Track Removal & Replacement (300 LF @ $85.00/LF)	25,500
Clean, Televise & Grout 2 - 36" VCP	
Cleaning & Televising (580 LF @ $76.50/LF)	44,370
Grouting & Testing (1933 gal. @ $11.00/gal.)	21,300
Remove Existing 30" VCP (30 LF @ $250.00/LF)	7,500
Remove Existing 36" VCP (100 LF @ $300.00/LF)	30,000
Install Bulkheads	5,000
Grout Existing 30" VCP (125 LF @ $40.00/LF)	5,000
Estimated Deduction	$ 437,742

WGK 1484150

ELIMINATE ALL OF PHASE IIIA
(HELMKAMP PRICES)

Removal of Box G	$ 15,000
Repair & Extension of Box D	
Concrete (31 cu.yds. @ $200.00/cu.yd.)	6,200
Forms (904 sq.ft. @ $12.50/sq.ft.)	11,300
Reinf. (5,800 lbs. @ $1.00/lb.)	5,800
Acid Brick & Membranes (656 sq.ft. @ $80.00/sq.ft.)	52,480
Exterior Membrane (495 sq.ft. @ $20.00/sq.ft.)	9,900
Volclay Panels (160 sq.ft. @ $5.00/sq.ft.)	800
Fiberglass Panels (176 sq.ft. @ $20.00/sq.ft.)	3,520
Removal of Wall & Top Slab	15,000
Crushed Stone Base	1,000
Patching Walls (13 batches @ $250.00/batch)	3,250
Bow Existing Walls & Floor	5,000
Riser & Collar	3,500
Top Slab on Riser	1,000
Earthwork (4,700 cu.yds. @ $15.00/cu.yd.)	70,500
Trench Excav. 36" VCP (200 LF @ $250.00/LF	50,000
New 36" VCP (372 LF @ $400.00/LF)	148,800
Sheet Piling (4,500 sq.ft. @ $30.00/sq.ft.)	135,000
Track Removal & Replacement (500 LF @ $85.00/LF)	42,500
Clean, Televise & Grout 2 - 36" VCP	
Cleaning & Televising (580 LF @ $76.50/LF)	44,370
Grouting & Testing (1,933 gal. @ $11.00/gal.)	21,300
Remove Existing 30" VCP (100 LF @ $250.00/LF)	25,000
Remove Existing 36" VCP (100 LF @ $300.00/LF)	30,000
Install Bulkheads	5,000
Grout Existing 30" VCP (125 LF @ $40.00/LF)	5,000
Removal of Manhole H	5,000
By-Pass Pumping	30,000
Open Excavate In Lieu of Tunnel (36")	25,000
Estimated Deduction	$ 771,220

WGK 1484151

ELIMINATE PART OF PHASE IIIA
(P. H. WEIS & ASSOC. REPORT)

Removal of Box G	$ 10,000
Extension of Box D	140,000
Installation of 2 - 36" VCP	143,000
Abandon 36" Lines	5,000
Clean, Televise & Grout 2 - 36" Lines	30,000
	328,000
	x 1.57**
Estimated Deduction	$ 515,000
New Base Bid Price	$ 4,815,000

** $\frac{\text{Helmkamp Price}}{\text{PHW Estimate}} = \frac{\$\ 5,330,000}{\$\ 3,400,000} = 1.57$

WGK 1484152

ELIMINATE ALL OF PHASE III A
(P. H. WEIS & ASSOC. REPORT)

Tunnel 36" Line Under Tracks	$ 224,000
Elimination of Manhole H & Connect to Box H	39,000
Elimination of Box G	10,000
Repair & Extend Box D	240,000
Install 2 - 36" Lines	143,000
Abandon 36" Lines	5,000
Clean, Televise & Grout 2 - 36" Lines	30,000
	691,000
	x 1.57 **
Estimated Deduction	$ 1,084,870
New Base Bid Price	$ 4,245,130

** $\frac{\text{Helmkamp Price}}{\text{PHW Estimate}} = \frac{\$\ 5,330,000}{\$\ 3,400,000} = 1.57$

WGK 1484153

REDUCED COST ESTIMATES

for Sewer Rehab Ph I, II & IIIA

ASSUMPTIONS

a) Costs are based on Low bidder's unit prices.
b) All other work remains the same.
c) Some costs are extracted from P.H. Weis + Assoc. estimates

ALT. #1

Description: Abandon: Box E and Lines E-B, E-D, E-H and E-G
Install: New box G on double 36", New box E south of old box E, New box H downstream of manhole H, lines H-D, H-E, E-G and extend double 36" 'for future use' between E & an extension on box C.

SAVINGS:

eliminate:	demolition of box G	$15,000	Ph
	Box construction is a wash	0	
	earthwork	70,500	Ph
	42" VCP, 545 LF @ $500/LF	272,500	
	Tunnel, 515 LF @ 1046/LF (McCarty)	538,690	
	Sheet Pile 155' x 30' x $30	139,500	
	Clean & TV @ 76.50 x 180 LF @	13,770	
	Grout, 180 LF x 10.7 gal/LF x $11	21,186	
	Remove 30" VCP	7,500	Ph
	Relocate benzene lines: 340' bore x 2 x $200/LF	136,000	
	800' pipe x 2 x $50	80,000	
	Trench 42" 155 LF @ 350	54,250	
	ST	- 1,348,896	
Increase:	170' of 36" VCP @ $400/LF	68,000	
	trench 36" 170' @ $250/LF	42,500	
	RR Track: (200' x 5ea - 240') x $30/LF	22,800	
	Remove Box E	30,000	
	ST	+ 163,300	
	net	- 1,185,596	
	contract cost:	4,144,404	

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ALT. #1 A

increase:	demolish 240' of 36" CE VCP x $300/LF	72,000
	install 240' of 36" VCP x 400$/LF	96,000
	Trench 120' of 42" x $350/LF	42,000
	tunnel 20' @ 2000	40,000
	[illegible] cost 4,144,726	72,000 +322

ALT # 1B

eliminate 135' of 36" vcp @ 400 — -54,000

net -1,239,596

cost 4,090,404

ALT # 2

Same as ALT #1 except;

eliminate:	30' of 42" vcp @ 500	15,000
	155' of 36" vcp @ 400	62,000
	155' of Trench @ 250/lf	38,750
	Tracks 50'x5x30	7,500
	Sheet pile 40'x30'x30	31,000
		159,250

net -1,344,846

cost 3,985,154

ALT # 2A

+322,000

net -1,022,846

cost 4,307,154

ALT # 2B

-54,000

net -1,398,846

cost 3,931,154

ALT # 3

Same as alt #2 Less a box @ 70,000

net -1,414,846

cost 3,915,154

ALT # 3A

+322 000

cost 4,237,154

ALT # 3B

-54,000

cost 3,861,154

Eliminate all I + II Pipe

eliminate:	42" VCP 745'x500/lf	372,500
	Tunnel 350'x400/lf	140,000
	1 Box @ 100 000	100,000
	Pile 150'x30'x30/sf	135,000
	Shorten Benzene lines 100 000	100,000
	Trench 370'x350/lf	129,500

net -977,000

cost 4,353,000

WGK 1484155

ALT #4

eliminate:	demolition of Box G	15,000 PW
	box construction is a wash	0
	245' 42" VCP @ $500/LF	122,500
	155' 36" VCP @ $400/LF	62,000
	sheet pile is a wash	0
	Tunnel 465 LF @ $1046/LF	538,690
	clean + TV 180 LF @ $6.50	13,770
	Grout - 180 LF x 10.7 gal/LF x $11/LF	21,186
	remove 30" RCP	7,500 PW
	relocate Benzene Lines	~~216,000~~
		− 996,646

Increase:	Remove box E	80,000
	Trench 42", 270' @ $350/LF	94,500
	Dewater well	30,000
		+ 154,500

net −842,146
cost 7,487,854

ALT #5

eliminate:	MH D & 2 boxes x 100,000	~~300,000~~
	30" Tunnel 395' x $1046/LF	413,170
	42" VCP CE 290' x $500/LF	145,000
	36" VCP CE 225' x $400/LF	90,000
	Trench 170' x $350/LF	59,500
	Pile 150' x 30' x $30/SF	135,000
	Benzene Lines	~~216,000~~
		− 1,358,670

WGK 1484156

Increase:	RR Tracks, 380' x $30/LF	+ 11,400

net − 1347,270
cost $3,982,730

PROJECT COST EST
Based on unit prices

Manholes:	Box 'D' extension @		70,000
	" J "		50,000
	Box H		150,000
	Box A		150,000
	Reline D: 118,750 - 69,772 = 48,978		50,000
	B		100,000
	C		75,000
	J		100,000
	I		75,000
PIPE:	42" VCP 760' x $500		380,000
	36" VCP 375' x $400		150,000
Tunnel:	72" 350' @ 995		348,250
	60" 165' @ 1046		172,590
Sheet Pile:	330' x 30' x $30/SF		297,000
TV + Grout:	2,855' x (76.50 + 194.20 + 10.74 x 11)		554,441
Track Removal:			25,500
Benzene Lines			216,000
Trench:	42" 370' x $350		129,500
	210' x 250		52,500
			3,145,781

WGK 1484157

POINT REPAIRS. TV & GROUT

Assumptions:

Required repairs are indicated by current sinkholes.
Replacement of 30' of VCP will be sufficient at each sink
Pipe can otherwise be repaired by raking and regrouting joints w/ Furan Tamping mix from inside.
Pipes presently designed for TV & Grout will not need additional work.
Boxes presently designed for relining will need relining.

Description:

TV + Grout all lines in current contract plus 30" VCP from manhole H To Box E.
Reline boxes B, C, D, G, J & I
Replace 30' of VCP CE:
West of Box C (double 36")
On Line E-B under TRRA Tracks and West of Box E
Replace double 36" G-E
Remake joints of Line E-B

COST EST:

TV + Grout 3055' @ $194.20	593,281
Reline boxes 70,000 for G + 400,000	470,000
Replace VCP: double unit price $800 x 120'	96,000
Trench: 120' x $350/Lf	42,000
Replace double 36": 30' x 2 x $400/Lf	24,000
excavations: 5000 cy x $15	$ 75,000
Remake joints: $400 - $100/Lf = $300/Lf x 190'	57,000
	1,357,281
Σ Unit Prices x quantities ≈ Engrs est. ≈ 3:2 / 1.57 ∴	x 1.57
COST	$ 2,130,931.20

WGK 1484158